

WHAT IS CLAIMED IS:

1. A method for determining discharging state from each nozzle of a head which discharges liquid droplets, comprising:
 - 5 a driving step of driving each of nozzles of the head to discharge liquid droplets;
 - a storage step of detecting a discharging state from each nozzle driven in said driving step and storing the discharging state as a physical amount in a 10 memory;
 - a calculation step of calculating a threshold for determining whether the discharging state from each of nozzles of the head is normal or abnormal, on the basis of the physical amount corresponding to each nozzle and 15 stored in the memory; and
 - a determination step of determining whether the discharging state from each nozzle is normal or abnormal, on the basis of the threshold calculated in said calculation step and the physical amount 20 corresponding to the nozzle.
2. A method according to claim 1, wherein in said calculation step, at least two thresholds for determining whether the discharging state from each of 25 nozzles of the head is normal or abnormal are calculated, and in said determination step, the physical amount corresponding to each nozzle is

evaluated on the basis of the at least two thresholds calculated in said calculation step and it is determined whether the discharging state from each nozzle is normal or abnormal, and further comprising:

5 a decision step of executing said driving step and said storage step again for an undetermined nozzle determined in said determination step not to be non-defective or defective, and deciding a threshold for determining whether the undetermined nozzle is non-
10 defective; and

 a step of determining whether the undetermined nozzle is non-defective or defective on the basis of the threshold decided in said decision step.

15 3. A method according to claim 1, wherein in said calculation step, at least two first thresholds for determining whether the discharging state from each of nozzles of the head is normal or abnormal are calculated, and in said determination step, the
20 physical amount corresponding to each nozzle is evaluated on the basis of said at least two first thresholds calculated in said calculation step, and determining whether the discharging state from each nozzle is normal or abnormal; and further comprising:

25 a step of identifying as an undetermined nozzle a nozzle to be driven next to a nozzle determined in said determination step to be defective;

5 a decision step of executing said driving step and said storage step again for the nozzle identified as the undetermined nozzle, and deciding a second threshold for determining whether the undetermined nozzle is non-defective; and

10 a step of determining whether the undetermined nozzle is non-defective or defective, on the basis of the second threshold decided in said decision step.

15 4. The method according to claim 1, wherein a plurality of neighboring nozzles of the head are divided into blocks, the threshold is calculated for each block in said calculation step, and it is determined whether the nozzle is non-defective or defective for each block in said determination step.

5. The method according to claim 1, wherein the physical amount includes a discharging time of droplet.

20 6. The method according to claim 5, wherein the physical amount includes a delay time until discharged droplet is detected after driving for discharge.

25 7. The method according to claim 1, wherein in said driving step, each nozzle of the head is driven a plurality of number of times.

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8. An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the
5 head to discharge liquid droplets;

storage means for detecting a discharging state from each nozzle driven by said driving means and storing the discharging state as a physical amount;

calculation means for calculating a threshold for
10 determining whether the discharging state of each of the nozzles of the head is normal or abnormal, by using the physical amount corresponding to each nozzle and stored in said storage means; and

determination means for determining whether the
15 discharging state from each nozzle is normal or abnormal, on the basis of the threshold calculated by said calculation means and the physical amount corresponding to the nozzle.

20 9. An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the head to discharge liquid droplets;

25 storage means for detecting a discharging state from each nozzle driven by said driving means and storing the discharging state as a physical amount;

calculation means for calculating at least two thresholds for determining whether the discharging state of each of the nozzles of the head is normal or abnormal, by using the physical amount corresponding to 5 each nozzle and stored by said storage means;

determination means for evaluating the physical amount corresponding to each nozzle on the basis of said at least two thresholds calculated by said calculation means, and determining whether the 10 discharging state of the nozzle is normal or abnormal;

decision means for executing processes of said driving means and said storage means again for an undetermined nozzle which is determined by said determination means not to be non-defective or 15 defective, and deciding a threshold for determining whether the undetermined nozzle is non-defective; and

means for determining whether the undetermined nozzle is non-defective or defective, on the basis of the threshold decided by said decision means.

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10. An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the 25 head to discharge liquid droplets;

storage means for detecting a discharging state from each nozzle driven by said driving means and

storing the discharging state as a physical amount;
calculation means for calculating at least two
first thresholds for determining whether the
discharging state of each of the nozzles of the head is
5 normal or abnormal, by using the physical amount
corresponding to each nozzle and stored by said storage
means;

determination means for evaluating the physical
amount corresponding to each nozzle on the basis of
10 said at least two first thresholds calculated by said
calculation means, and determining whether the droplet
discharging state of the nozzle is normal or abnormal;

means for identifying as an undetermined nozzle,
a nozzle to be driven next to a nozzle determined by
15 said determination means to be defective;

decision means for executing processes of said
driving means and said storage means again for the
nozzle identified as the undetermined nozzle, and
deciding a second threshold for determining whether the
20 undetermined nozzle is non-defective or defective; and

means for determining whether the undetermined
nozzle is non-defective or defective, on the basis of
the second threshold decided by said decision means.

25 11. The apparatus according to claim 8, wherein a
plurality of neighboring nozzles of the head are
divided into blocks, said calculation means calculates

the threshold for each block, and said determination means determines for each block whether each nozzle is non-defective or defective.

5 12. The apparatus according to claim 8, wherein the physical amount includes a discharging time of droplet.

13. The apparatus according to claim 12, wherein the physical amount includes a delay time until discharged
10 droplet is detected after driving for discharge.

14. The apparatus according to claim 8, wherein said driving means drives each nozzle of the head a plurality of number of times.

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15. An ink-jet printer comprising an apparatus recited in claim 8.

16. An ink-jet printer comprising an apparatus
20 recited in claim 9.

17. An ink-jet printer comprising an apparatus recited in claim 10.